Fig.1

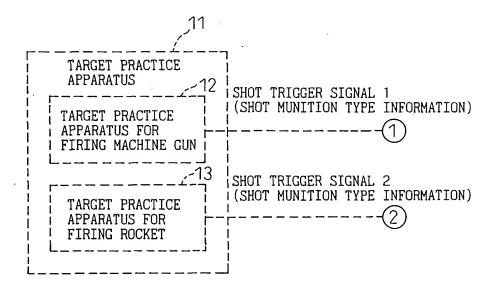


Fig. 2

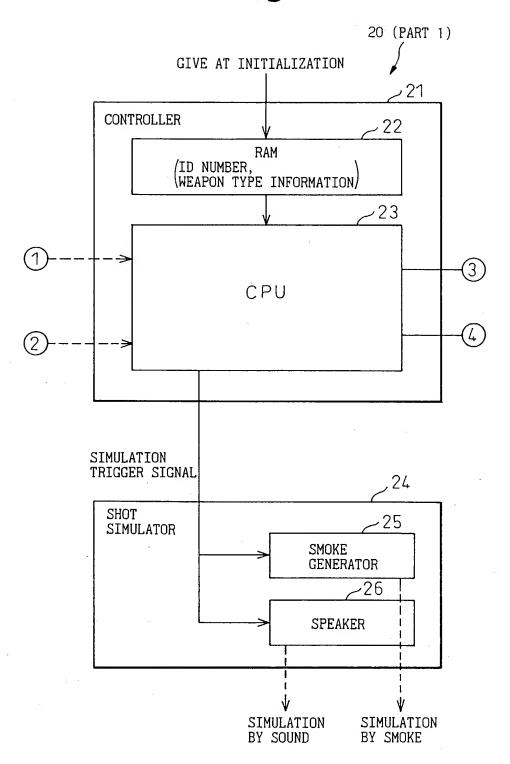


Fig.3

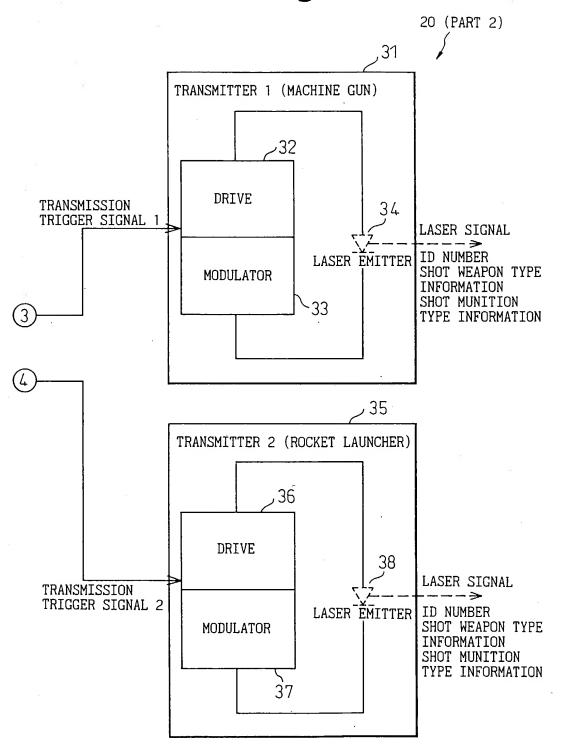
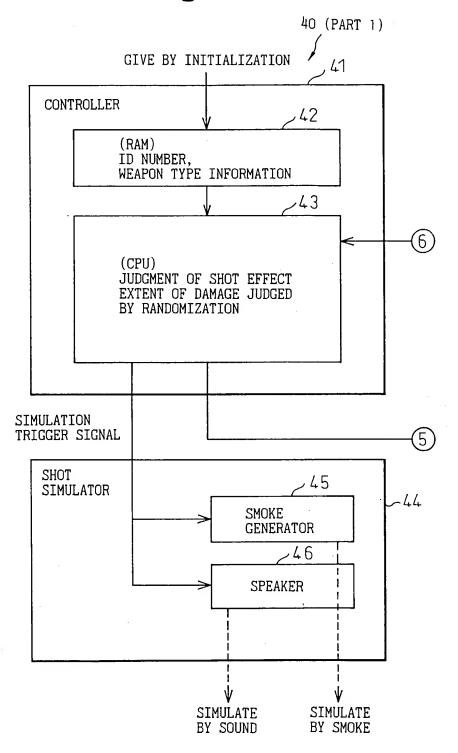


Fig.4



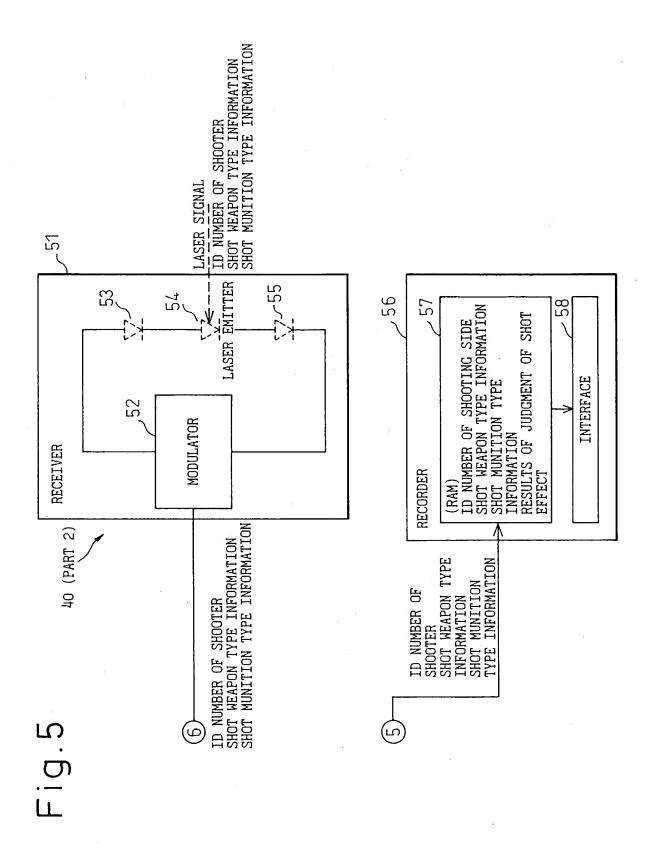
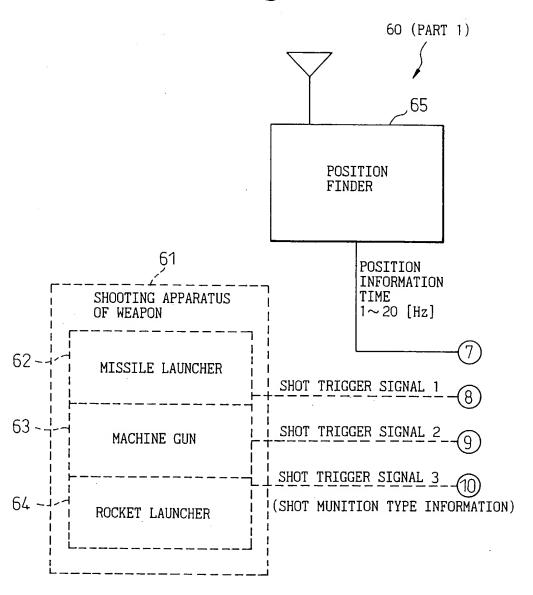


Fig.6



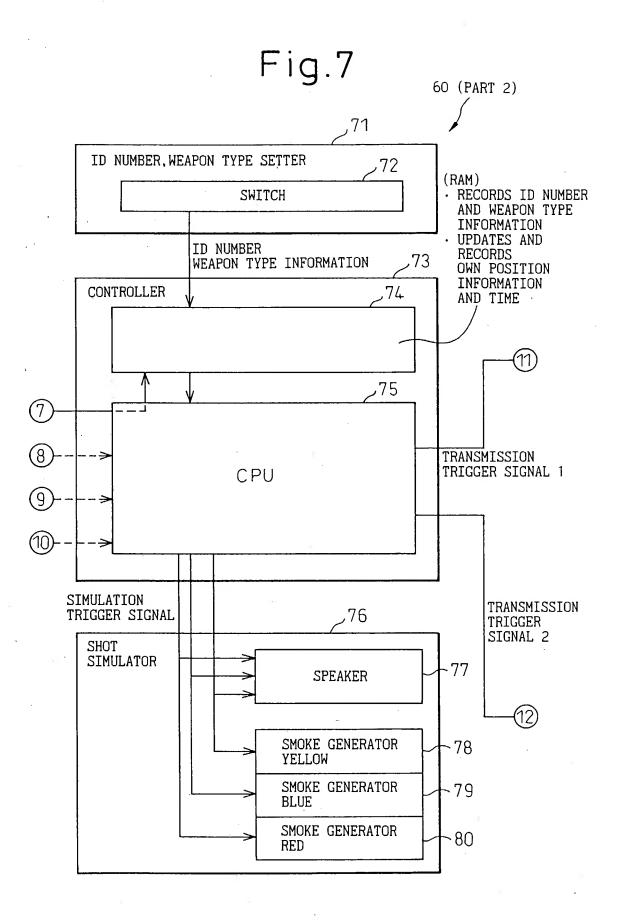
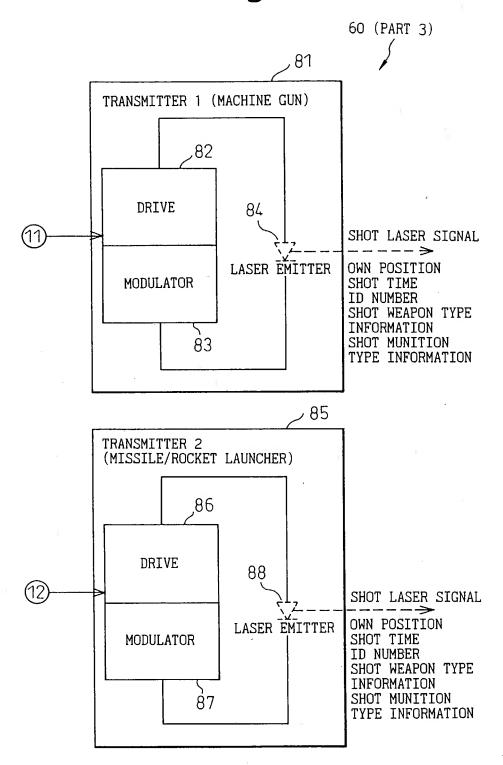


Fig.8

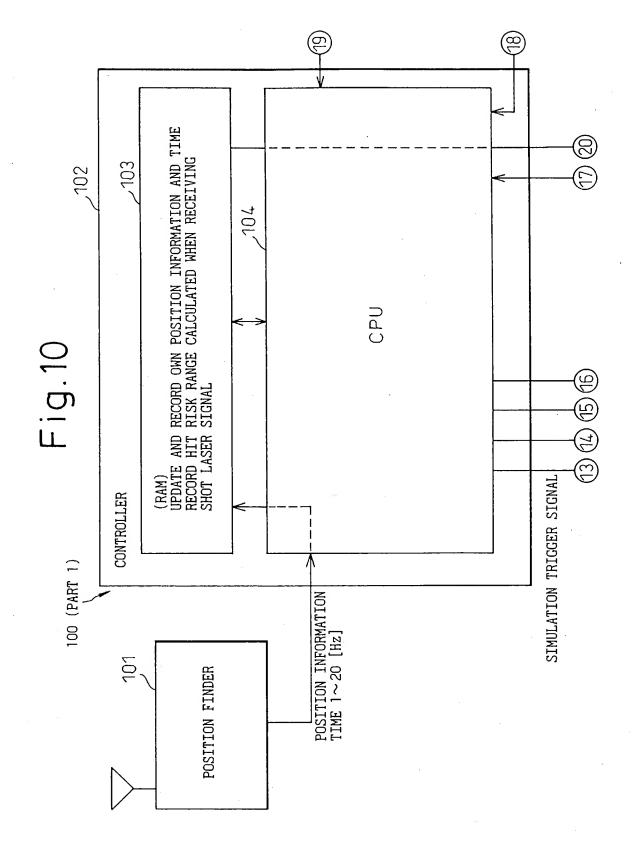


SET ID NUMBER
AND WEAPON TYPE
ID NUMBER/
WEAPON TYPE
SETTER , 93 ID NUMBER WEAPON TYPE INFORMATION TRANSMIT SIMULATED SHOT LASER SIGNAL <CONTROLLER> 96 RECEIVE SHOT TRIGGER SIGNAL <CONTROLLER> 76~ TRANSMISSION TRIGGER SIGNAL SIMULATION TRIGGER SIGNAL SIMULATE SHOT <SHOT SIMULATOR> Fig.9 95 POSITION TINFORMATION /TIME UPDATE POSITION INFORMATION /TIME CCONTROLLERY POSITION INFORMATION/TIME FIND POSITION

POSITION

FINDER 9 TIME

9/45



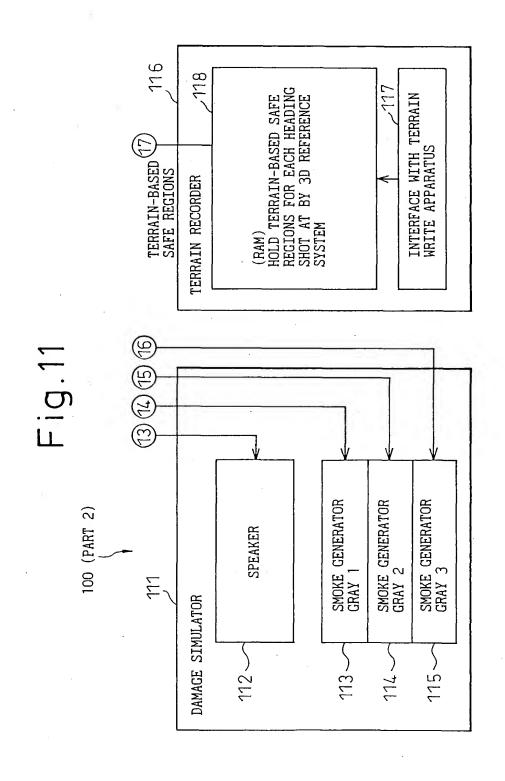
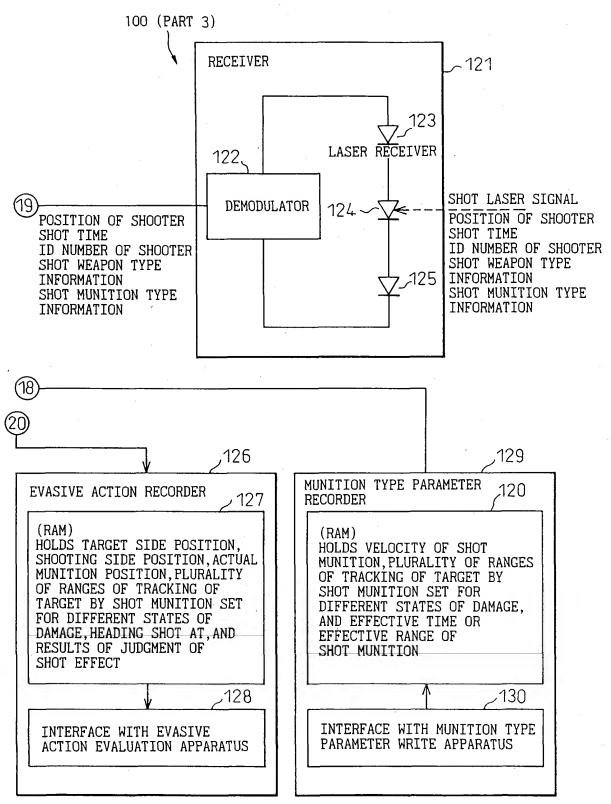


Fig. 12

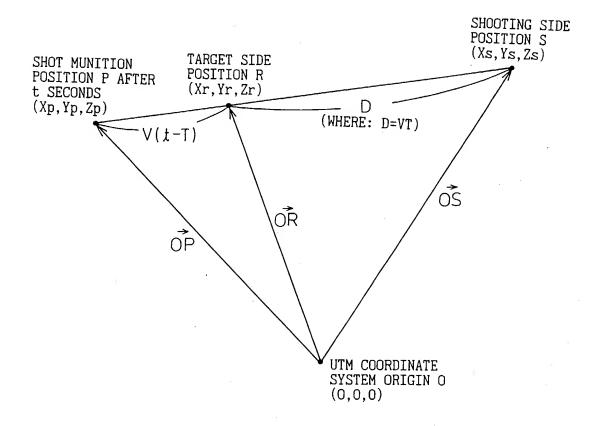


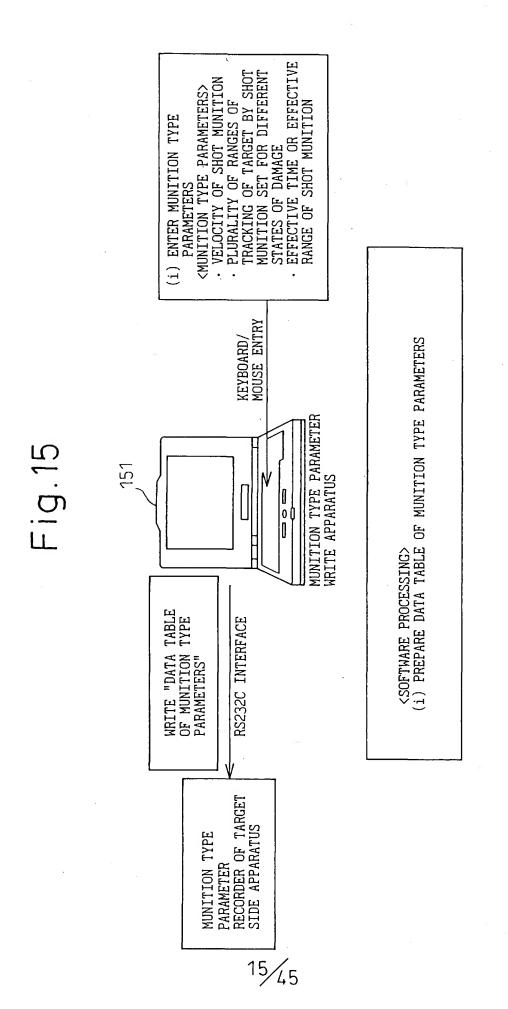
SIMULATE DAMAGE DAMAGE 136 RECORD EVASIVE
ACTION
EVASIVE ACTION
RECORDER POSITION INFORMATION/TIME 134 CALCULATE HIT RISK RANGE <CONTROLLER> RECEIVE SIMULATED SHOT LASER SIGNAL <RECEIVER> 135 Fig.13 JUDGE SHOT EFFECT <CONTROLLER> UPDATE
POSITION
INFORMATION
// TIME
CCONTROLLER> INFORMATION POSITION INFORMATION POSITION INFORMATION/TIME FIND POSITION

POSITION

FINDER TIME

Fig.14





CALCULATE DISTANCE D BETWEEN SHOOTING SIDE AND TARGET SIDE IN 3D REFERENCE SYSTEM AT TIME WHEN TARGET SIDE APPARATUS RECEIVES SHOT LASER SIGNAL

$$D = \sqrt{(Xr - Xs)^{2} + (Yr - Ys)^{2} + (Zr - Zs)^{2}}$$



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CALCULATE EXPECTED POSITION OF SHOT MUNITION FOR EVERY ELAPSE OF TIME FROM TIME WHEN TARGET SIDE APPARATUS RECEIVES SHOT LASER SIGNAL TO EFFECTIVE TIME TE OF SHOT MUNITION BASED ON CALCULATED DISTANCE D.

$$\overrightarrow{OP} = \frac{\{V(t-T)+D\} \ \overrightarrow{OR} - \{V(t-T)\} \ \overrightarrow{OS}}{-\{V(t-T)\} + \{V(t-T)+D\}}$$

FROM,
POSITION P (Xp,Yp,Zp) OF SHOT MUNITION AFTER t
SECONDS AFTER SHOT BECOMES AS FOLLOWS:

$$\begin{cases} Xp = \frac{\{V(t-T)+D\}Xr - \{V(t-T)\}Xs}{-\{V(t-T)\} + \{V(t-T)+D\}} \\ Yp = \frac{\{V(t-T)+D\}Yr - \{V(t-T)\}Ys}{-\{V(t-T)\} + \{V(t-T)+D\}} \\ Zp = \frac{\{V(t-T)+D\}Zr - \{V(t-T)\}Zs}{-\{V(t-T)\} + \{V(t-T)+D\}} \end{cases}$$



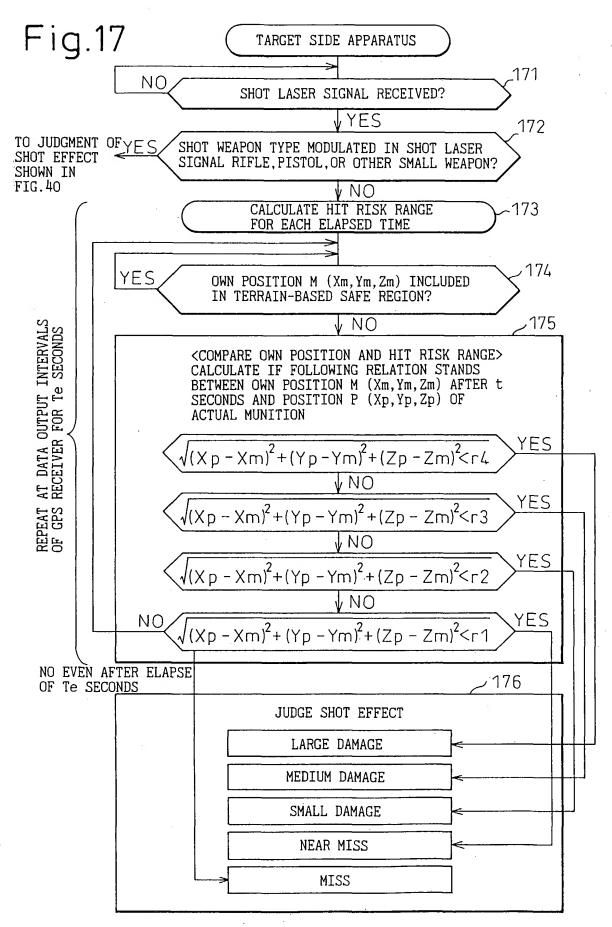
163ر

CALCULATE HIT RISK RANGE FOR EVERY ELAPSE OF TIME BASED ON EXPECTED POSITION OF SHOT MUNITION FOR EVERY ELAPSE OF TIME

EXTENT OF DAMAGE

HIT RISK RANGE AFTER t SECONDS BECOMES AS IN FOLLOWING TABLE FOR EACH STATE OF DAMAGE (r1>r2>r3>r4)

TOLEOWING TABLE FOR EACH STATE OF BRIENCE (TYTESTS)T4)			
	HIT RISK RANGE		
NEAR MISS	RANGE OF RADIUS r1 TO r2 ABOUT POSITION P (Xp,Yp,Zp) OF SHOT MUNITION		
SMALL DAMAGE	RANGE OF RADIUS r2 TO r3 ABOUT POSITION P (Xp,Yp,Zp) OF SHOT MUNITION		
MEDIUM DAMAGTE	RANGE OF RADIUS r3 TO r4 ABOUT POSITION P (Xp,Yp,Zp) OF SHOT MUNITION		
LARGE DAMAGE	RANGE OF LESS THAN RADIUS r4 ABOUT POSITION P (Xp,Yp,Zp) OF SHOT MUNITION		



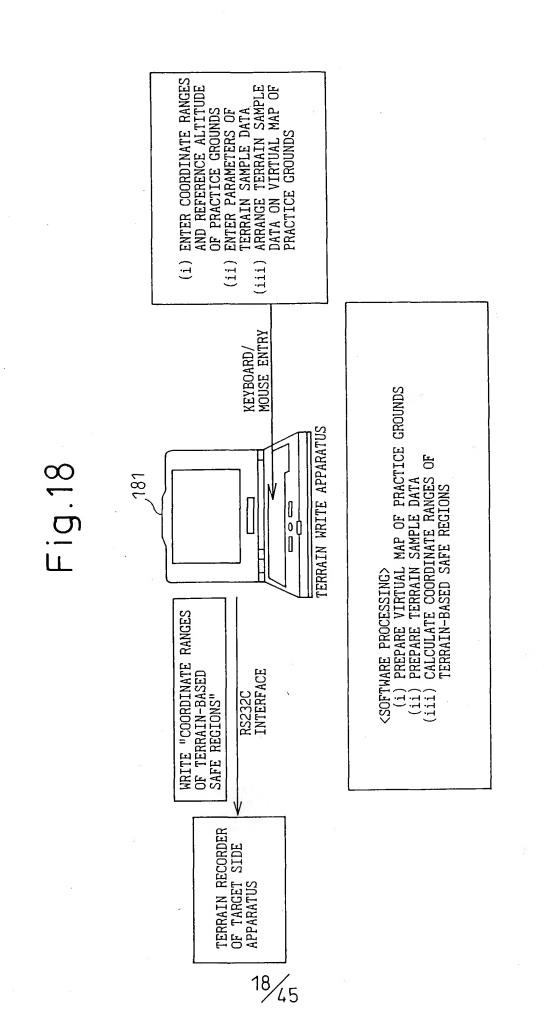


Fig. 19

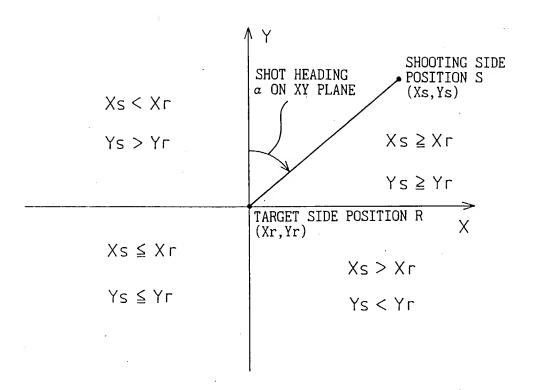


Fig. 20

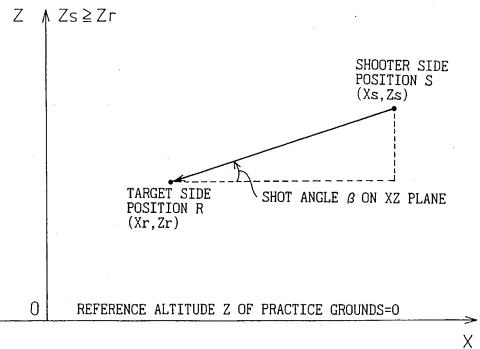
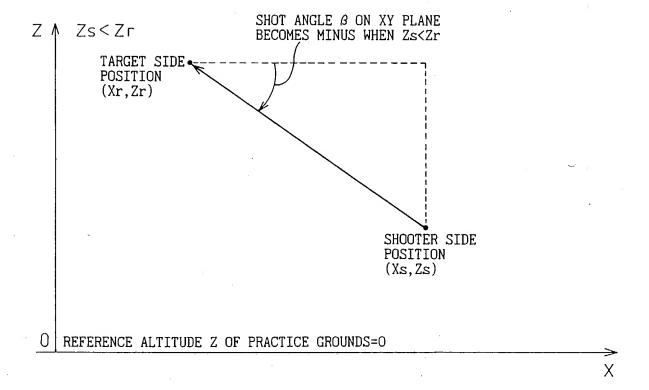


Fig.21



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CALCULATE DISTANCE Dxy BETWEEN SHOOTING SIDE AND TARGET SIDE ON XY PLANE WHEN TARGET SIDE RECEIVES SHOT LASER SIGNAL

$$Dxy = \sqrt{(Xr - Xs)^2 + (Yr - Ys)^2}$$



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CALCULATE IN WHAT QUADRANT ON XY PLANE SHOOTING SIDE APPARATUS IS IN USING POSITION OF SHOOTING SIDE ON XY PLANE AS ORIGIN O

CONDITION	QUADRANT
Xs≧Xr AND Ys≧Yr	1ST QUADRANT
Xs>Xr AND Ys <yr< td=""><td>2ND QUADRANT</td></yr<>	2ND QUADRANT
Xs≦Xr AND Ys≦Yr	3RD QUADRANT
Xs < Xr AND Ys > Yr	4TH QUADRANT



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CALCULATE SHOT HEADING α ON XY PLANE USING DISTANCE Dxy BETWEEN SHOOTING SIDE AND TARGET SIDE ON XY PLANE FROM FORMULA SET FOR EACH CORRESPONDING QUADRANT

QUADRANT	FORMULA FOR CALCULATION OF SHOTH EADING α ON XY PLANE
1ST QUADRANT	$\alpha = 90^{\circ} - (\cos^{-1} \frac{ Xs - Xr }{Dxy}) \times \frac{180}{\pi}$
2ND QUADRANT	$\alpha = 90^{\circ} + (\cos^{-1} \frac{ Xs - Xr }{Dxy}) \times \frac{180}{\pi}$
3RD QUADRANT	$\alpha = 270^{\circ} - (\cos^{-1} \frac{ Xs - Xr }{Dxy}) \times \frac{180}{\pi}$
4TH QUADRANT	$\alpha = 270^{\circ} + (\cos^{-1} \frac{ Xs - Xr }{Dxy}) \times \frac{180}{\pi}$

CALCULATE SHOT ANGLE & ON XZ PLANE BY FOLLOWING FORMULA:

$$\beta = \sin^{-1}(\frac{(Z_S - Z_r)}{\sqrt{(X_S - X_r)^2 + (Z_S - Z_r)^2}}) \times \frac{180}{\pi}$$

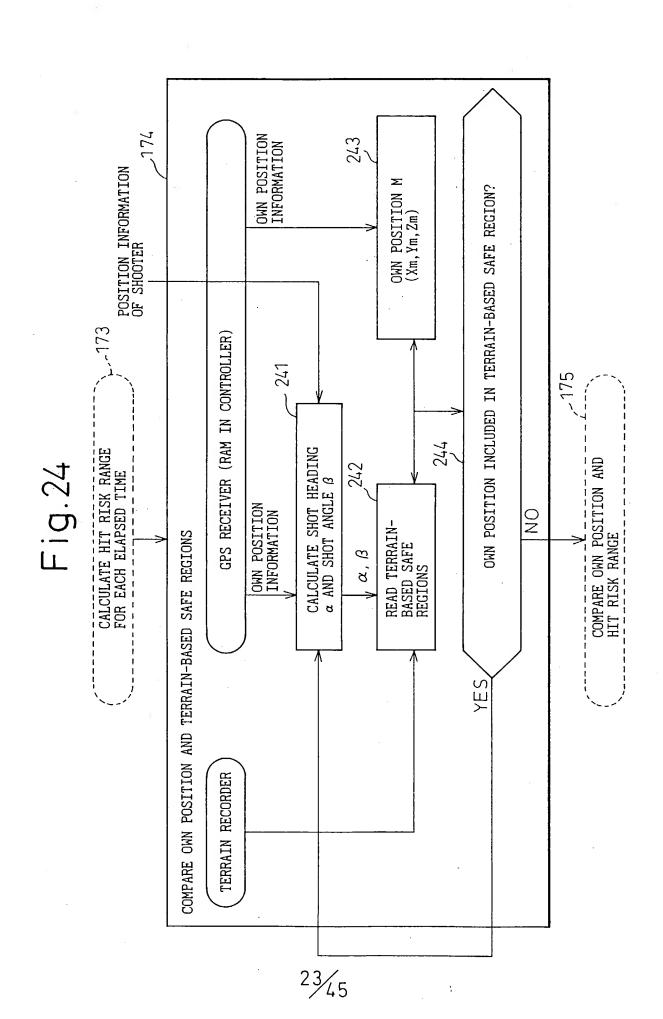
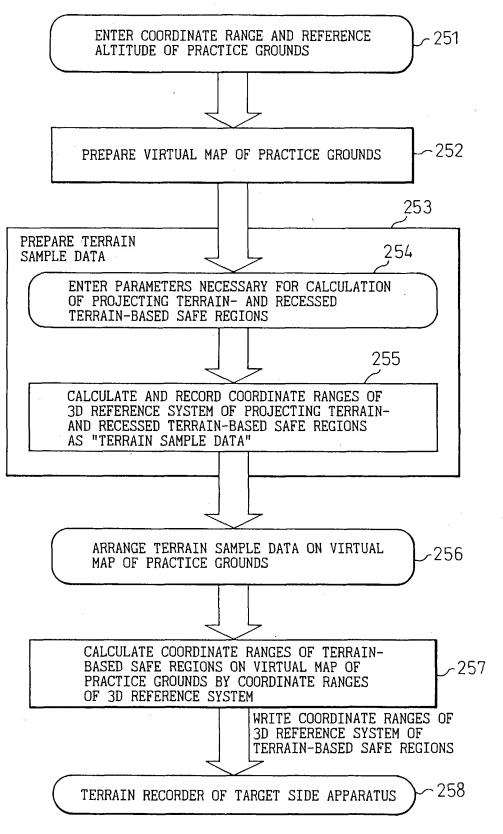
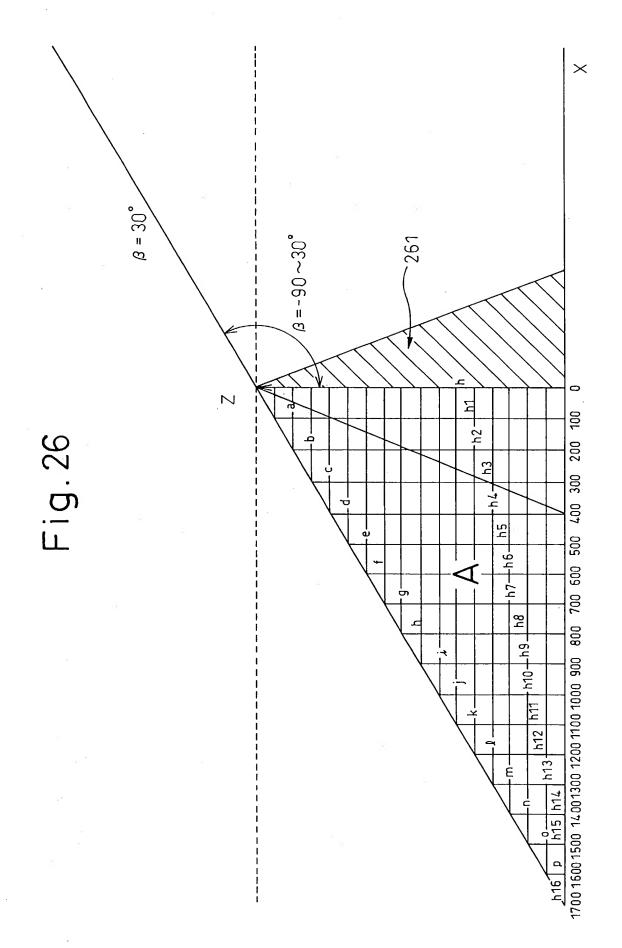
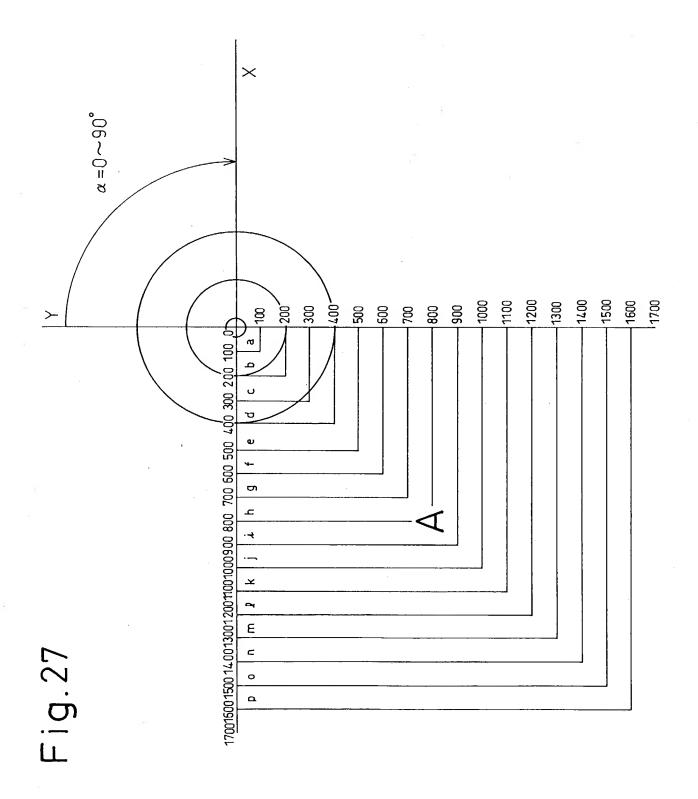


Fig.25







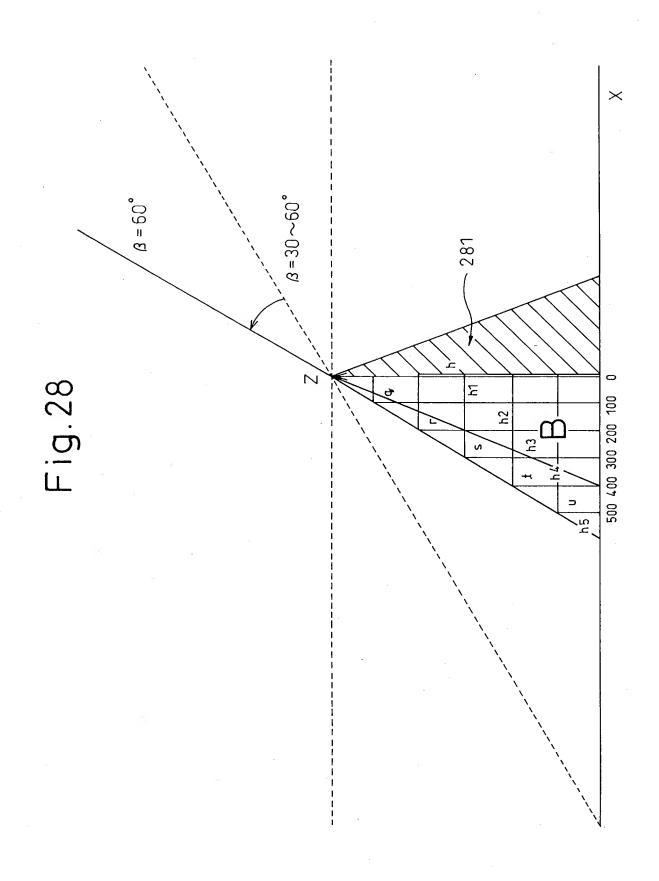


Fig.29

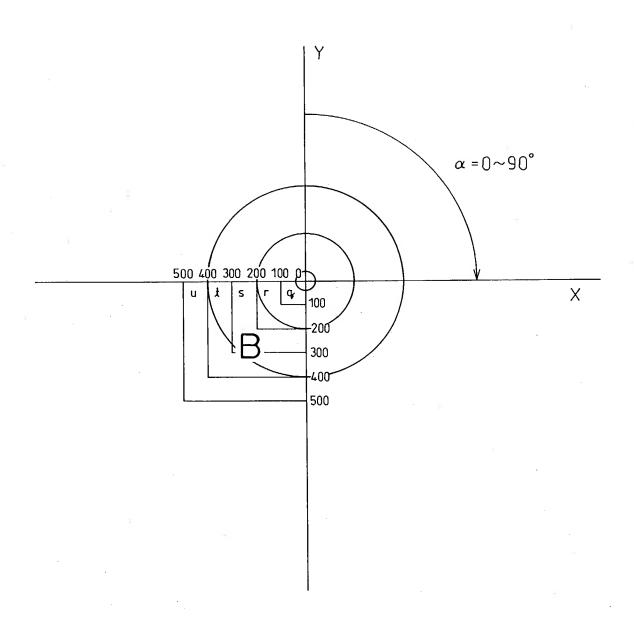


Fig.30

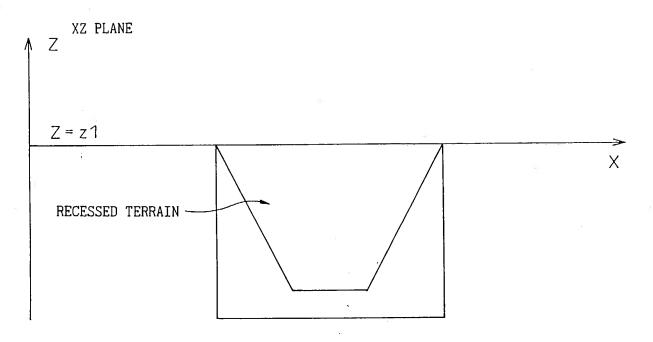
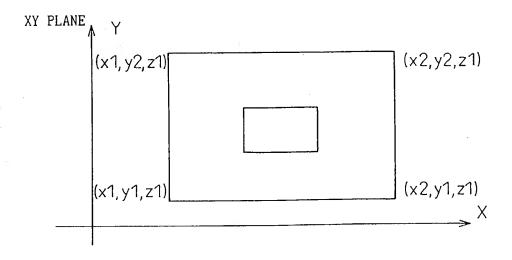
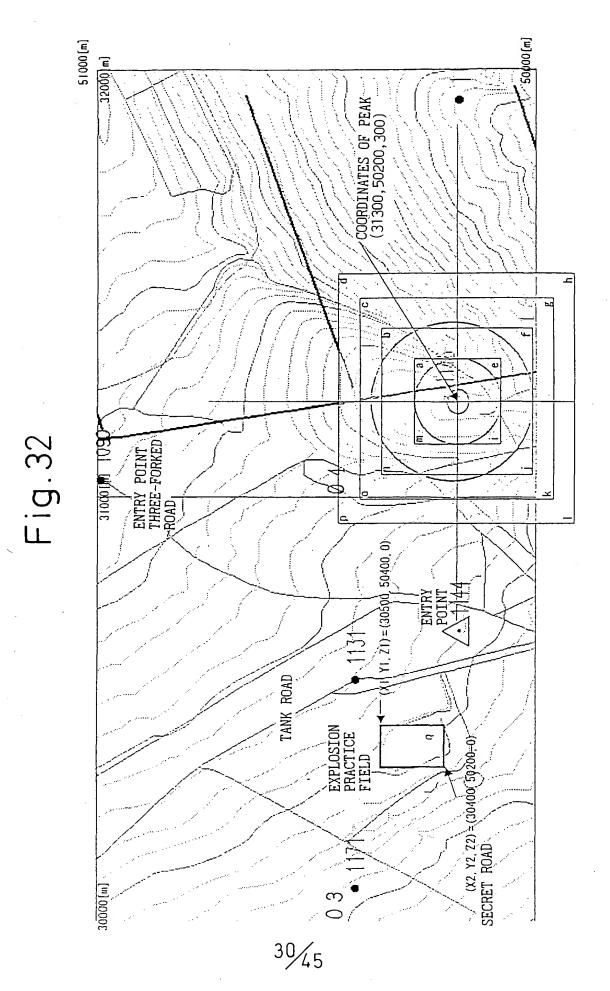
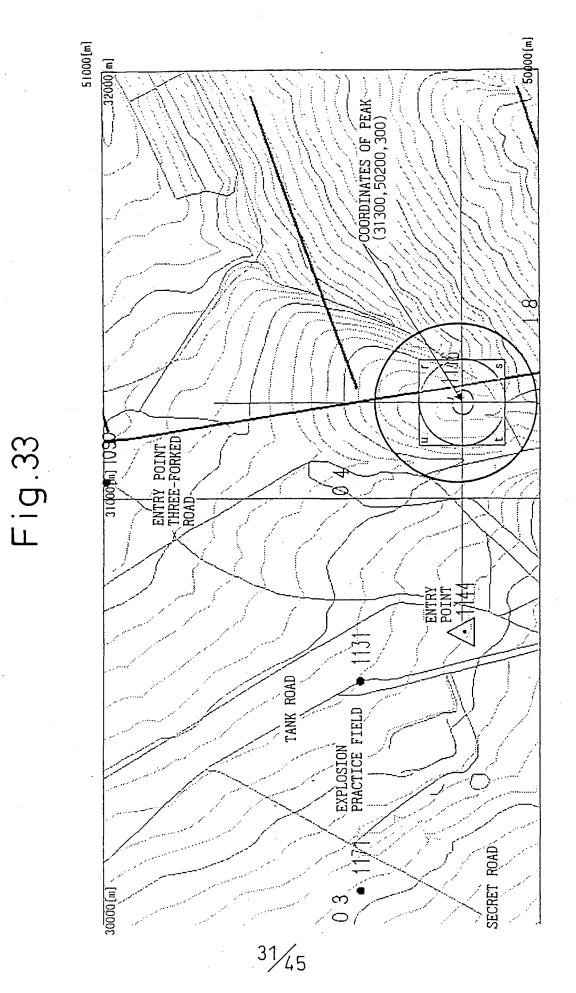


Fig.31







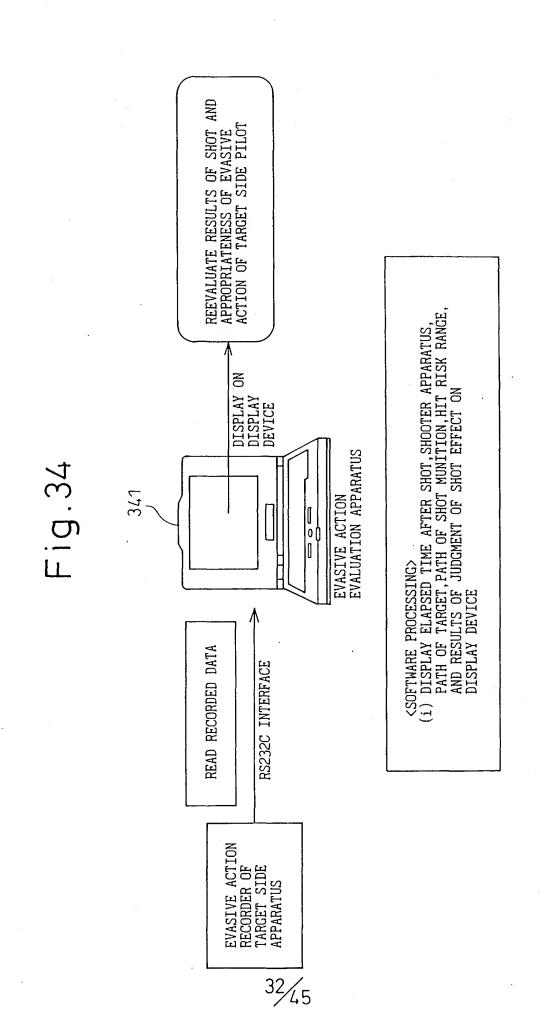
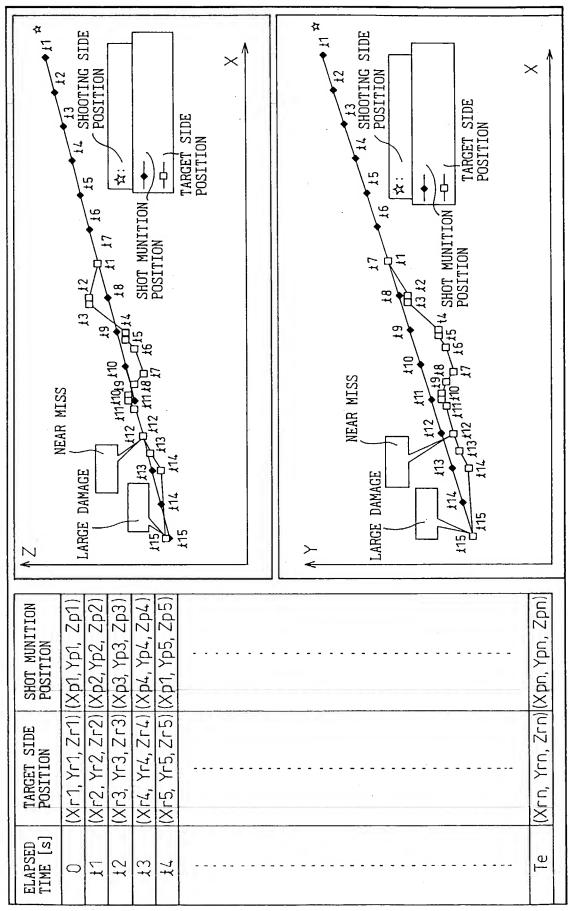
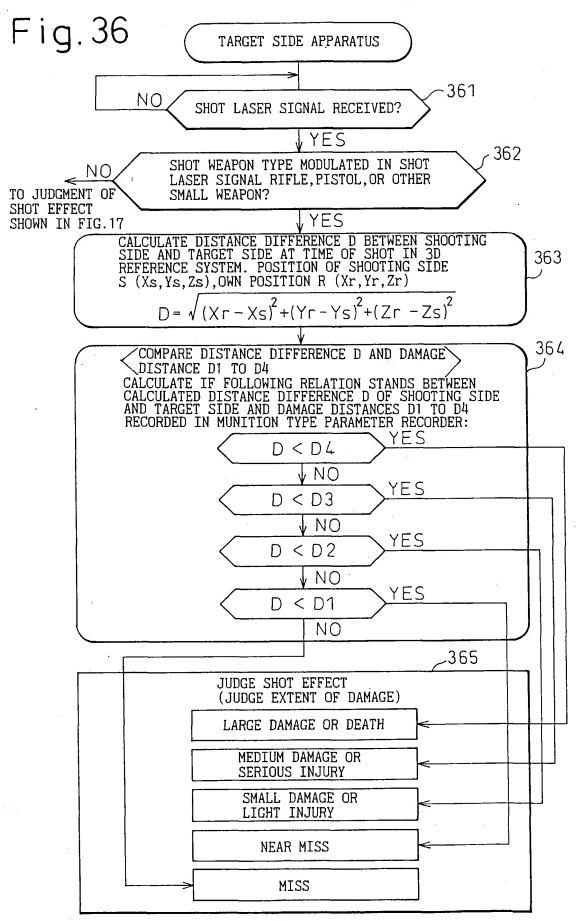
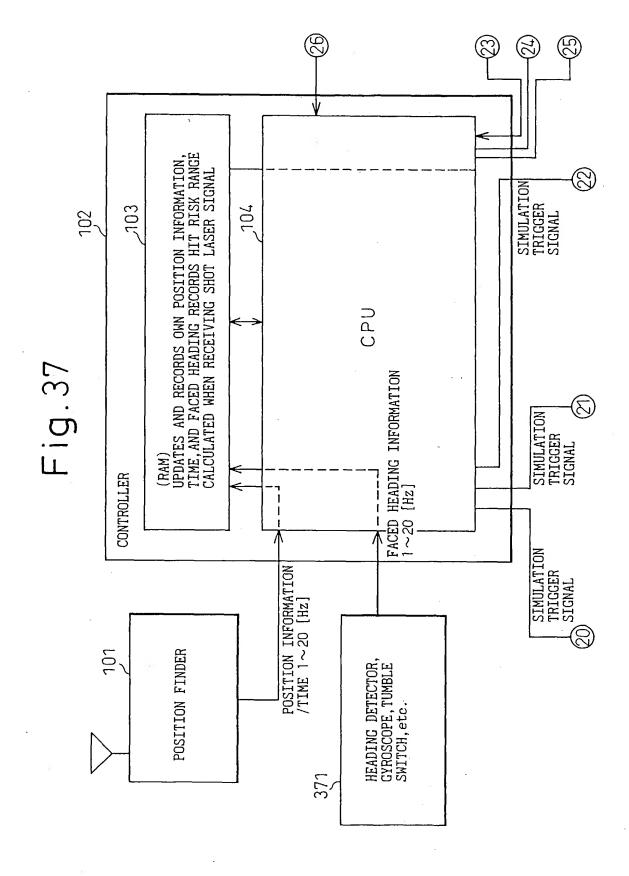


Fig.35



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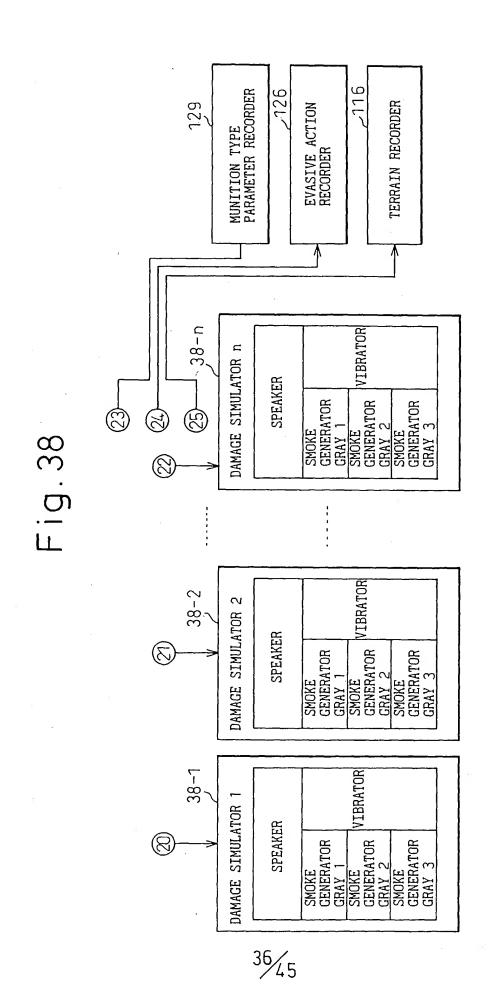


Fig.39

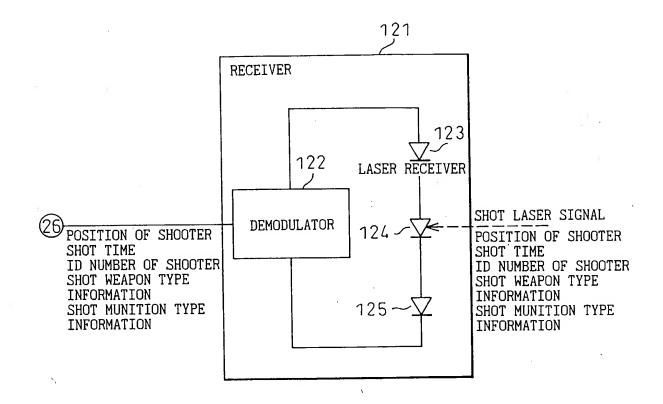
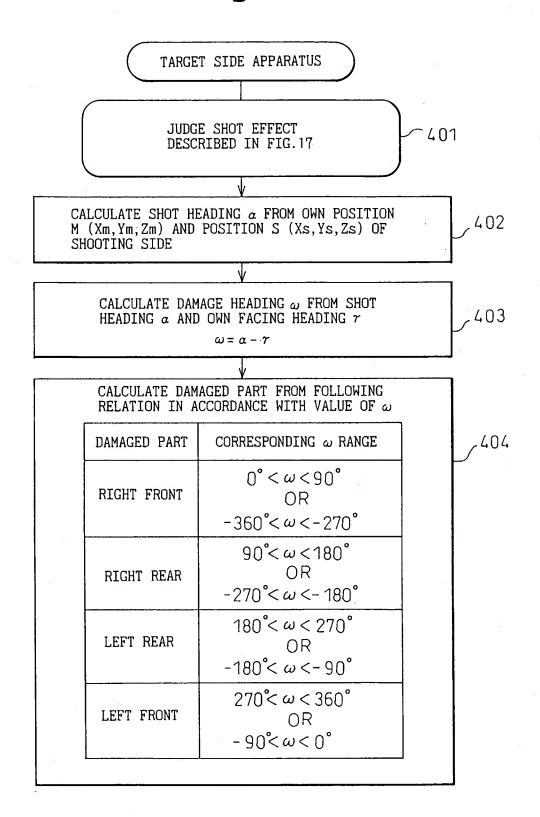


Fig. 40



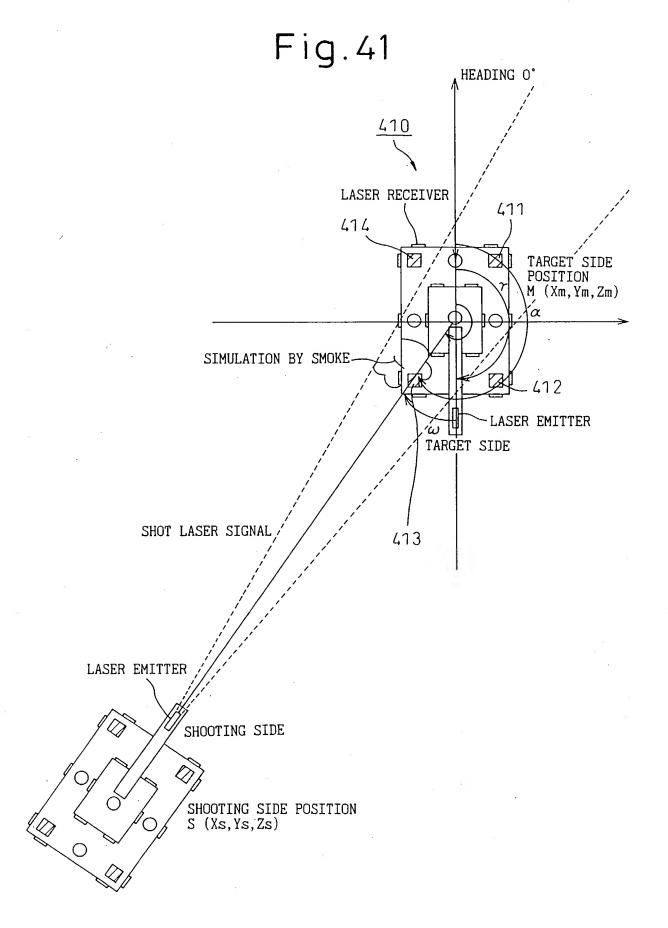


Fig.42

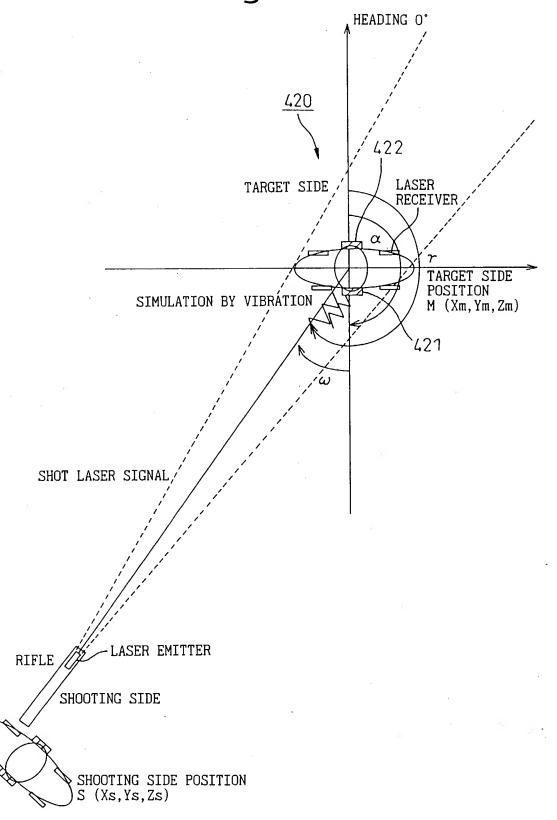
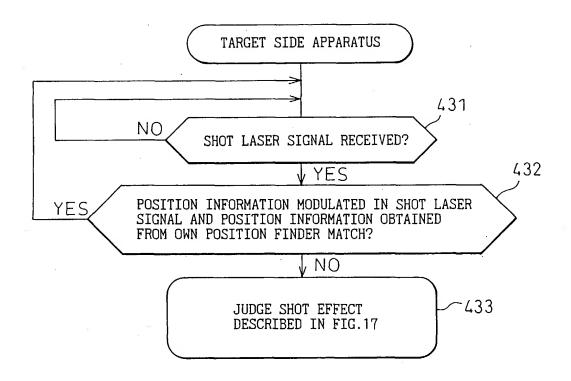
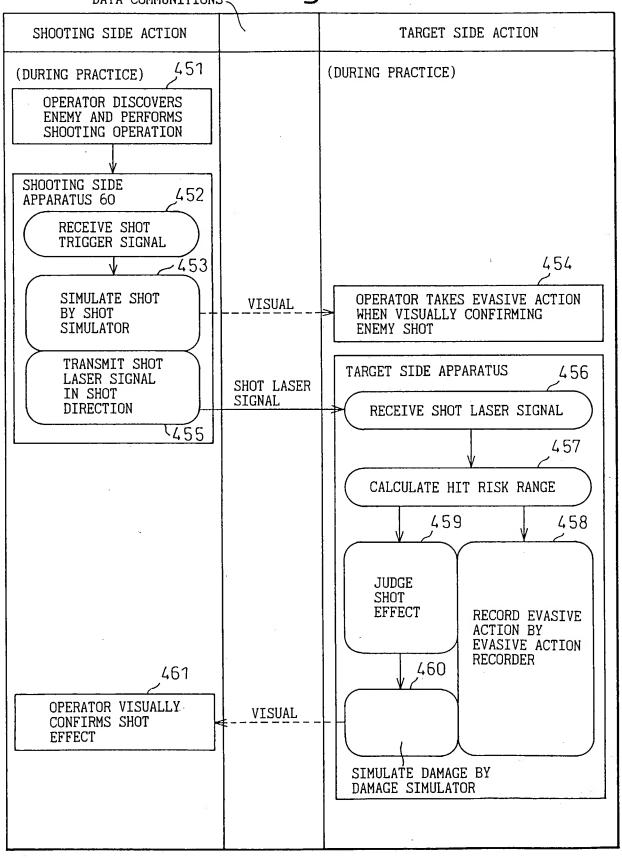


Fig.43



DATA COMMUNICA	LION, A	
SHOOTING SIDE ACTION		TARGET SIDE ACTION
SHOOTING SIDE APPARATUS 60 SET TYPE AND ID NUMBER OF WEAPON MOUNTED AT SHOOTING SIDE APPARATUS BY ID NUMBER/WEAPON TYPE SETTER		(BEFORE START OF PRACTICE) TERRAIN WRITE APPARATUS 181 ARRANGE TERRAIN SAMPLE DATA ON VIRTUAL MAP OF PRACTICE GROUNDS MATCHED WITH ACTUAL TERRAIN OF REGION FOR PRACTICE GROUNDS MATCHED WITH ACTUAL TERRAIN OF REGION FOR PRACTICE 443 CALCULATE COORDINATE RANGES OF TERRAIN-BASED SAFE REGIONS IN TERRAIN-BASED SAFE REGIONS IN TERRAIN RECORDER OF TARGET SIDE APPARATUS MUNITION TYPE PARAMETER RECORDER 129 SET MUNITION TYPE PARAMETERS FOR EACH SHOT WEAPON TYPE AND SHOT MUNITION TYPE USED IN PRACTICE 446 PREPARE DATA TABLE OF MUNITION TYPE PARAMETERS IN MUNITION TYPE PARAMETERS OF TARGET SIDE APPARATUS

DATA COMMUNITIONS, Fig. 45



DATA COMMUNICATIONS

SHOOTING SIDE ACTION	TARGET SIDE ACTION
(AFTER END OF PRACTICE)	(AFTER END OF PRACTICE) EVASIVE ACTION EVALUATION 462 READ RECORDED DATA FROM EVASIVE ACTION RECORDER OF TARGET SIDE APPARATUS DISPLAY PATH OF TARGET SIDE etc. ON DISPLAY DEVICE
REEVALUATE EFFECT OF	SHOT AND EVASIVE ACTION OF TARGET SIDE

